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THE MOSQUITOES (DIPTERA:CULICIDAE) OF THE AÇORES

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RESUMO. Apresenta-se o resultado do estudo de uma colecção de mosquitos dos Açores, com cerca de 1.680 espécimes, organizada pelos autores em Agosto-Setembro de 1977 e Julho-Setembro de 1979, a par de uma revisão crítica da informação disponível na literatura. Os nossos conhecimentos da culicideofauna do arquipélago são resumidos numa breve lista incluindo os nossos dados e os achados válidos de outros autores, em cada uma das diferentes ilhas.

PALAVRAS CHAVE: Açores, mosquitos, culicidae, sistemática, distribuição geográfica.

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ABSTRACT. The results of the study of a mosquito collection of about 1,680 specimens, made by the writers in the Açores, during August-September 1977 and July-September 1979, are presented, along with a critical revision of the available information in the literature. Our present knowledge of the culicids of the archipelago is briefly summarized in a checklist including our data and the valid data of others authors, in each of the islands.

KEY WORDS: Açores, mosquitoes, culicidae, systematics, geographical distribution.

INTRODUCTION

The volcanic archipelago of the Açores, comprising the inhabited islands of S. Miguel, Santa Maria, Terceira, Graciosa, S. Jorge, Pico, Faial, Flores and Corvo, lies in the middle of the North Atlantic Ocean, between 37° and 40° N latitude and 25° and 31° W longitude, at a mean distance from the European Continent (Portugal) of about 1,900 Km. The area of each island varies from only 17.13 to 757.25 Km², for Corvo and S. Miguel, respectively.

From the biogeographical viewpoint, the impoverished fauna and flora of the archipelago are obviously of Palaearctic affinities.

Culex pipiens L. was the first mosquito taxon to be recorded (as *Culex varioannulatus* and *Cx. azoriensis*), by THEOBALD (1903), on the basis of specimens collected in the island S. Miguel by Dr. M. Graham. A few years later, the same author added a new record, *Culiseta longiareolata* Macquart (as *Theobaldia spathipalpis*) to the island (THEOBALD, 1910). F. W. Edwards, studying a mosquito collection made, in 1929, by Mr. Balfour-Brown in the island of Pico, also identified *Cx. pipiens* and described a new species, *Culiseta atlantica* (as *Theobaldia*) based on five females (EDWARDS, 1932). In 1936, SÉGUY, examining the mosquito collection made by Chopard et Méquignon, in 1930, in the island of S. Miguel, also found *Cs. longiareolata* and published several new species records, namely *Anopheles maculipennis* Meigen, *An. superpictus* Grassi, *Aedes aegypti* (L.) (as *fasciatus*), *Culiseta alaskaensis* (Ludlow), *Cs. subochrea* Edwards (both as *Theobaldia*), *Ochlerotatus caspius* (Pallas), and *Oc. detritus* (Haliday) (both as *Aedes*). In 1945, FREY published the results of his geological and botanical exploration of the Açores, adding *Culiseta annulata* (Schrank), as *Theobaldia*, to the presumed list. Much later, R. A. Capela published the occurrence of autogeny and stenogamy in the *Cs. longiareolata* population of Ponta Delgada, island of S. Miguel (CAPELA, 1979a), as well as the form *molestus* of *Cx. pipiens* (CAPELA, 1979b), also from Ponta Delgada. The last contribution to the knowledge of the mosquitoes of the Açores was made by RAMOS & RIBEIRO (1980) with the description of the male, larva and pupa of *Culiseta atlantica* (Edwards) from S. Miguel.

So, 11 mosquito species and complexes of sibling species were recorded from the Açores, a somewhat unexpected number given namely its distance from the Continent, reduced island areas, and relatively high latitude. In reality, neither anophelines nor *Ae. aegyti* (L.) have been recorded in the Açores since the late thirties, while it seems now quite clear that *Culiseta atlantica* has been misidentified either as *Cs. alaskaensis* (Ludlow), *Cs. annulata* (Schränk) or *Cs. subochrea* (Edwards). On the other hand, the available evidence strongly suggests that the only *Ochlerotatus* present in the archipelago is the now extremely rare *Oc. detritus* (Haliday). Lastly, as to *Culex molestus* Forskal, it is treated as an infrasubspecific form of *Cx. pipiens* L. by the generality of the authors. Though this may be questionable, the record of form *molestus* cannot, in any case, be based on the simple occurrence of autogeny and stenogamy in a given *pipiens* s. l. population.

The results of our survey confirmed the expected poorness of the mosquito fauna of the Açores, reducing the previous presumed list to the only 4 species here recognized, one of them endemic: *Culex* (*Cux.*) *pipiens* L. 1758, *Culiseta* (*All.*) *longiareolata* (Macquart, 1839), *Culiseta* (*Cul.*) *atlantica* (Edwards, 1932), and *Ochlerotatus* (*Och.*) *detritus* (Haliday, 1833).

This paper is based on material collected by the two last authors in the island of S. Miguel, during August 1977, as well as in a collection made by the first author in all the inhabited islands, except S. Jorge, during July-September 1979, making a total of about 1,680 specimens: 595 adults (286 males and 309 females), 914 larvae, 95 pupae and pupal exuviae, plus a few egg batches and some larvae and pupal pelts in alcohol.

In the account that follows, the material examined of each species and its distribution among the surveyed islands of the archipelago are given, reference being also made to previous valid records by others authors.

SYSTEMATIC ACCOUNT

Culex (*Culex*) *pipiens* Linnaeus, 1758

Culex pipiens was the first mosquito species recorded from the Açores (island of S. Miguel), by THEOBALD (1903), based on specimens collected by Dr. M. Graham. Much later, this species was successively recorded in the islands of Pico, by EDWARDS (1932), S. Miguel (Furnas; Ponta Delgada), S. Jorge, by SÉGUY (collections of Chopard and Méquignon), and Terceira (Angra do Heroísmo; Praia da Victória), Faial (Horta; Ribeira dos Flamengos) and Flores (Santa Cruz; Ribeira Boqueiros), by FREY (1945).

Material examined

A total of about 500 *Cx. pipiens* specimens (82 males, 94 females, 262 larvae, 7 pupae and pupal exuviae plus a few egg batches) were collected in the islands and localities that follow.

S. MIGUEL: Arrifes; Caldeiras; Capelas; Furnas; Lomba da Maia; Nordela; Pico da Barrosa; Povoação; Ribeira do Salto; SANTA MARIA: Santo Antão; PICO: Santa Bárbara da Ribeira; Silveira; FAIAL: Capelinhos; Cedros; Espalamaca; Horta; Quinta do Lourenço; Ribeira do Adão; Ribeira dos Flamengos; Ribeira Funda; Salto. Also unrecorded localities of islands TERCEIRA, GRACIOSA, FLORES and CORVO.

Immatures in rock-pools, ground-pools and artificial containers, often in association with *Cs. longiareolata* and, sometimes, with *Cs. atlantica*. Adults *ex larva*. Collectors not bitten.

***Culiseta (Allotheobaldia) longiareolata* (Macquart, 1839)**

Cs. longiareolata was firstly recorded in the Açores (S. Miguel), as *Theobaldia spathipalpis*, by THEOBALD (1910). Later, SÉGUY (1936) also recorded the species (as *Theobaldia longiareolata*) from Furnas, (S. Miguel) and Monte Brasil, in Terceira. In 1938, FREY confirmed *longiareolata* in Furnas (S. Miguel), and extended the range of the species in Terceira (Bagacina), and into the islands of Faial (Ribeira Escabra; Ribeira Flamengos) and Flores (Stª Cruz; Vales; Caldeira Seca).

Material examined

About 1,000 *Cs. longiareolata* specimens (167 males, 197 females, 558 larvae, 56 pupae and pupal pelts plus larvae and pupal pelts in alcohol) were collected, as follows. S. MIGUEL: Achada; Arrifes; Caldeiras; Candelária; Capelas; Cerrado dos Bezerros; Fajã de Cima; Escalvado; Furnas; Ilhéu da Vila Franca; Lagoa do Fogo; Lomba da Maia; Nordela; Nordeste; Pedreira do Nordeste; Pico da Barrosa; Porto Formoso; Povoação; Relva; Ribeira do Salto; Salga; Santana; Serra Gorda; Várzea. SANTA MARIA: Faneca; Santo Antão. PICO: Lages; Santa Bárbara da Ribeira; Silveira; Terra do Pão. FAIAL: Caldeiras; Capelinhos; Capelo; Cedros; Espalamaca; Farroubo; Feteira; Horta; Monte da Guia; Quinta do Lourenço; Ribeira do Adão; Ribeira dos Flamengos; Salto; Trupes. Also unrecorded localities in the islands GRACIOSA, FLORES and CORVO.

Adults *ex larva*. Immatures in rock-pools, cement tanks and other artificial containers, often in association with *Cx. pipiens* and *Cs. atlantica*. Collectors not bitten.

***Culiseta (Culiseta) atlantica* (Edwards, 1932)**

Described by EDWARDS (as *Theobaldia*) from the island of Pico, on the basis of five syntype females collected by Mr. Balfour-Brown in 1929, no other records of this species were known until the papers by RAMOS & RIBEIRO (1980), describing the male, larva and pupa. In the present writers view, the records of *Culiseta alaskaensis* (Ludlow) and *Cs. subochrea* (Edws.) by SÉGUY (1936), and those of *Cs. annulata* (Schrank) by FREY (1945), in the islands of S. Miguel (Lagoa do Congro), Terceira (Bagacina; Lagoa Achada), S. Jorge (Ribeira Funda), and Faial (Ribeira Flamengos) have to be considered as misidentifications of *Cs. atlantica* Edwards.

Material examined

37 males, 17 females, 94 larvae, and 32 pupae and pupal pelts of *Cs. atlantica* were collected, making a total of 180 specimens distributed as follows. S. MIGUEL: Ribeira do Salto. FAIAL: Capelinhos; Capelo; Ribeira do Salto; Salto.

Adults *ex larva*. Immatures in well shaded rock-pools (basalt) along river margins, with dark brown water and fallen leaves, in the Laurisilva forest gallery. Usually in association with *Cx. pipiens* and *Cs. longiareolata*. Collectors not bitten.

***Ochlerotatus (Ochlerotatus) detritus* (Haliday, 1833)**

SÉGUY (1936) was the only author who recorded *Ochlerotatus caspius* (Pallas) and *Oc. detritus* (Haliday), both as *Aedes*, from the Açores (Furnas, island of S. Miguel). Apparently, however, only *detritus* is now present in the archipelago, even though as an extremely rare species.

Material examined

Only one *Oc. detritus* specimen, a female, was found during all the survey. S. MIGUEL: Ponta Delgada.

CHECKLIST

The list below includes, for each island, both our distributional data and those of previous authors for the only four species which occurrence could be validated during the present survey.

S. MIGUEL

***Culex pipiens* L.** Unrecorded locality (THEOBALD, 1903), as *Culex azoriensis* and *Cx. varioannulatus*; Furnas (SÉGUY, 1936); Ponta Delgada (SÉGUY, 1936; CAPELA, 1979b). Also the following new locality records (NLRs): Arrifes, Caldeiras, Capelas, Lomba da Maia, Nordela, Pico da Barrosa, Povoação and Ribeira do Salto.

***Culiseta longiareolata* (Macquart).** Unrecorded locality (THEOBALD, 1910), as *Theobaldia spathipalpis*; Furnas (SÉGUY, 1936; FREY, 1945), as *Theobaldia*; Ponta Delgada (CAPELA, 1979a). Also the following NLRs: Achada, Arrifes, Caldeiras, Candelária, Capelas, Cerrado dos Bezerros, Fajã de Cima, Escalvados, Ilhéu de Vila Franca, Lagoa de Fogo, Lomba da Maia, Nordela, Nordeste, Pedreira do Nordeste, Pico da Barrosa, Porto Formoso, Povoação, Relva, Ribeira do Salto, Salga, Santana, Serra Gorda and Várzea.

***Culiseta atlantica* Edwards.** Furnas (SÉGUY, 1936), as *Theobaldia alaskaensis* and *Th. subochrea*; Lagoa do Congro (FREY, 1945), as *Th. annulata*; Ribeira do Salto (RAMOS & RIBEIRO, 1980).

***Ochlerotatus detritus* (Haliday).** Furnas (SÉGUY, 1936), as *Aedes*. Also Ponta Delgada, NLR.

SANTAMARIA

Culex pipiens L. Santo Antão. New island record.

Culiseta longiareolata (Macquart). Faneca, Santo Antão. New island records.

TERCEIRA

Culex pipiens L. Angra do Heroísmo; Praia da Victória (FREY, 1945). Also unrecorded locality by the present writers.

Culiseta longiareolata (Macquart). Monte Brasil (SÉGUY, 1936); Bagacina (FREY, 1938), both as *Theobaldia*.

Culiseta atlantica Edwards. Bagacina, Lagoa Achada (FREY, 1945), both as *Theobaldia*.

S. JORGE

Culex pipiens L. Unrecorded locality (SÉGUY, 1936); Ribeira Funda (FREY, 1945).

GRACIOSA

Culex pipiens L. New island record (unrecorded locality).

Culiseta longiareolata (Macquart). New island record (unrecorded locality).

PICO

Culex pipiens L. Serra Gorda (?) (EDWARDS, 1932) Also Santa Bárbara da Ribeira, Silveira and Terra do Pão, all NLRs.

Culiseta longiareolata (Macquart). Lages, Santa Bárbara da Ribeira, Silveira and Terra do Pão, all NLRs.

Culiseta atlantica Edwards. Serra Gorda, the type locality (EDWARDS, 1932).

FAIAL

Culex pipiens L. Horta; Ribeira dos Flamengos (FREY, 1945).

Culiseta longiareolata (Macquart). Ribeira Escabra, Ribeira dos Flamengos (FREY, 1945).

Culiseta atlantica Edwards. Ribeira dos Flamengos (FREY, 1945), as *Th. annulata*. Also Capelinhos, Capelo, Ribeira do Salto and Salto, all NLRs.

FLORES

Culex pipiens L. Santa Cruz, Ribeira Borqueiros (FREY, 1945). Also unrecorded locality by the present writers.

Culiseta longiareolata (Macquart). Caldeira Seca, Santa Cruz, Vales (FREY, 1945). Also unrecorded locality by the present writers.

CORVO

Culex pipiens L. New island record (unrecorded locality).

Culiseta longiareolata (Macquart). New island record (unrecorded locality).

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NOTES ON TWO MADEIRA PLANTS

By N. C. H. KRAUSS ¹

The composite plant «Abundância» (*Eupatorium adenophorum* Spreng.) has been known in Madeira for many years. On July 24, 1962 I collected a second species of *Eupatorium*, *E. riparium* Schultz-Bip., confirmed by the Royal Botanic Garden, Kew, England. This was growing in association with *E. adenophorum* in a damp area along a path near Monte. Both these species of *Eupatorium* are native to Mexico. I have seen *E. riparium* growing along a small stream in a ravine at the Desierto de los Leones, Distrito Federal, in the hills above Mexico City. Both species are pests in grazing land in Hawaii.

On November 7, 1960 I collected specimens of *Ulex minor* Roth (determined by Royal Botanic Garden, Kew) in the grassy hills above Ribeiro Frio. Since then I have seen it also at Encumeada and Santo da Serra. *Ulex europaeus* L. has been known in Madeira for a long time, but I have not seen any records of *U. minor*.

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